No. 8. — *Reports on the Scientific Results of an Expedition to Rain Forest Regions in Eastern Africa*

VIII

Oligochaeta

By Wilhelm Michaelsen

INTRODUCTION

The following pages contain an account of the Oligochaeta obtained by Mr. Arthur Loveridge on his expedition to Uganda and Kenya Colony in the years 1933 and 1934. In addition there are a few worms collected by him in the Uluguru Mountains of Tanganyika Territory (Mandated German East Africa) during his journey of 1926–1927, which were not examined by my late colleague and friend, Mr. J. Stephenson, in his report (1933, pp. 225–247) on the material collected in 1929–1930.

My thanks are due to Dr. Thomas Barbour, Director of the Museum of Comparative Zoölogy, for entrusting me with the examination of this oligochaetal collection, valuable as are all such from Tropical Africa, a region so productive of interesting species of Oligochaeta. The main collection, containing the types of the new species, is in the Museum of Comparative Zoölogy, Cambridge, Massachusetts; some cotypes are deposited in the Zoölogical Museum at Hamburg.

Family ACANTHODRILIDAE

Subfamily OCTOCHAETINAE

Genus Dichogaster Beddard

Dichogaster bagiloana sp. nov.

One mature specimen, internally somewhat softened, from Bagilo (about 6°50′ south lat., 37°50′ east long.), 6,000 feet, Uluguru Mountains, Tanganyika Territory.

External Characters. Length 60 mm., diameter 4–4½ mm. Segments about 130.

Colour whitish, result of posthumous bleaching?

Body cylindrical.

Head? Prostomium drawn in, obviously very small; a longitudinal dorsal furrow, presumably coming from the prostomium, divides segment I.

Setae very slender, very strictly paired, all of them decidedly ventral in position.

First dorsal pore at the intersegmental furrow V/VI.

Clitellum annular, occupying segments XIII–XX (=8), being only feebly developed at segment XX which is as short as the normal segments following, whereas the proper clitellar segments are distinctly longer.

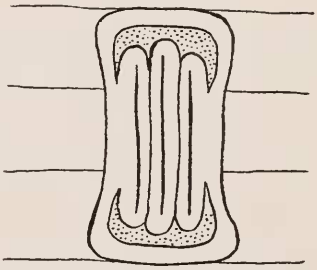

Fig. 1. *Dichogaster bagiloana*. Male sexual field.

Male sexual field (fig. 1) medio-ventral, between the intersegmental furrow XVI/XVII and XVII/XVIII, biscuit-shaped, bilaterally symmetrical, distinctly longer than its greatest breadth, broadest in segments XVII and XIX, narrowed in segment XVIII, curved laterally but with straight anterior and posterior borders. The bordering walls are moderately broad but progressively narrowing until reaching segment XVIII. The interior of the male field bears three pairs of lighter, nearly whitish, straight longitudinal walls, all rather close together, those of each pair uniting at the ends by a round connecting part. The median pair is slightly longer than either of the lateral ones, all of them extend far into segments XVII and XIX. Between the longitudinal walls of each pair is a sharp, straight, longitudinal furrow. I presume that the furrows of the lateral pairs are seminal furrows. The space between these walls and the outer wall bordering the male field in segments XVII and XIX is somewhat depressed, especially at the sides. Here it is somewhat broader, the lateral pairs of longitudinal walls being shorter than the median pair. I presume that the pores of the prostates—2 pairs at segments XVII and at XIX—are situated in the deepest depressions in the 4 corners of the male field,

but I could not recognise them, neither could I recognise a connection between these depressions and the supposed seminal furrows. Equally uncertain is the position of the male pores which are to be sought in the interior of the male field, presumably in the seminal furrows at segment XVIII.

Spermathecal pores indistinct, 2 pairs in the intersegmental furrows VII/VIII and VIII/IX in the lines of the median pairs of setae, in *ab.*

Internal Anatomy. Septa VI/VII–IX/X very thin but IX/X slightly thickened in the centre, while X/XI–XIII/XIV are moderately thickened.

Fig. 2. *Dichogaster bagiloana.* Prostata.

Alimentary canal. Two gizzards in segments V and VI. 3 pairs of almost equally large, whitish chylous pouches in segments XV, XVI and XVII, apparently entirely separated from one another, kidney-shaped with relatively smooth surfaces, but their somewhat broad, convex ridge is crossed by many densely-grouped, darker stripes which partly take the shape of furrows. The intestine bears a simple, large, ribbon-shaped, irregularly meandering typhlosolis.

Nephridia (mostly destroyed in the type) are very small, sac-shaped, and apparently very numerous (about 6 or more in each half of a segment ?).

Anterior male organs holoandric. Two pairs of testicles apparently depend free into the body cavity of segments X and XI; apparently only one pair of seminal vesicles depend from septum 11/12 into segment XII. They are small, much broader than long, multipartite, with a short and narrow stalk.

Posterior male organs. Two pairs of nearly equally large prostates (fig. 2) in the body cavity of segments XVII and XIX. These segments are slightly expanded dorsally. Glandular part moderately long, above the intestine, touching or nearly touching that of the other side,

irregularly cylindrical, rather thick, especially at their ectal part (where they are as much as 1 mm. thick), irregularly meandering and bent, the folds of the undulations closely adpressed; glandular part smooth externally and without noticeable muscles, mainly composed of glandular cells, its axial lumen very narrow. I am not quite sure whether the lumen is provided with an epithelium, the cells of which are indistinct between the densely crowded fine ducts of the glandular cells discharging into the lumen. The duct of the prostate is sharply set off from the thick ectal end of the glandular part, rather short and uniformly very thin, (about 0.1 mm. thick in all its length, muscular with a distinct epithelium covering its narrow, axial channel. Each prostate is provided with a penial-seta-sac. Each sac contains a single penial seta which resembles in shape, though not in dimensions or ornamentation, that of the allied species *D. kigogoana* Stephenson (1933, p. 233, fig. 6). Stephenson's drawing of the whole seta might well pass for that of my new species if we do not consider the matter of size. A penial seta of *D. bagiloana* is about 2.3 mm. long and about 15μ thick in the middle of the shaft (for *D. kigogoana*, 1.34 mm. long and 15μ thick in the middle of the shaft), distinctly thickened at the ental end (here about 50μ thick). In general the seta is nearly straight, being only noticeably bent in its ental eighth, while its ectal end is bluntly tipped and slightly hooked. There are a few very faint undulations on the ectal half of the shaft (somewhat less distinct than in the figured seta of *D. kigogoana*, but in some penial setae of this species its author remarks that the undulations "may be almost indistinguishable"). I could recognise no ornamentation of the penial seta of *D. bagiloana* such as would appear to be characteristic of *D. kigogoana*; in the latter, however, the ornamentation is so scanty that its absence would not constitute an important systematic difference.

Spermathecae entirely similar to those of *D. kigogoana*. In fact, Stephenson's drawing (1933, p. 233, fig. 5) of a spermatheca could pass for one of *D. bagiloana*, but on a closer examination of the latter no thecocystis was found. Ampulla rather small, globular or stoutly pyriform, thin-walled, clearly distinct from the middle portion. The latter is greater than the ampulla, thicker and somewhat longer, globular, or nearly so, with slightly stouter walls which are smooth on the outer surface but with some longitudinal projections into the lumen. The muscular duct of the spermatheca is about as long as the middle portion, not sharply set off from it, conical, narrowing towards its ectal end, with narrow and smooth axial canal and thick muscular wall. Its ental end does not project noticeably into the lumen of the

middle portion. A single, rather large, sub-globular diverticulum, containing a sperm ball, depends downwards beside the ental half of the duct, discharging into the basal part of the middle portion of the spermatheca through a short, narrow stalk.

Remarks. D. bagiloana is so nearly allied to *D. kigogoana* Stephenson (1933, p. 232) from the Uzungwe Mountains, that I was at first uncertain whether or not to regard it as a subspecies of that worm. *D. kigogoana* is much smaller, about half as long and half as thick. The difference in the size of the body as well as in the size of certain organs cannot be considered as a juvenile character for the type specimen of the smaller worm is fully mature, and already sexually functional, the spermatheca containing sperm. The main differences are as follows: the clitellum is annular in the new species, saddle-shaped in Stephenson's worm. In my species the prostates have a rather large, very thick, meandering glandular part with a very narrow lumen, whilst in *D. kigogoana* they are said to be rather small, tubular, and not coiled. In *D. bagiloana* the penial setae are very much larger and show no trace of the ornamentation which characterizes the smaller examples of *D. kigogoana.* A remarkable difference may be found in the configuration of the male sexual field which is very complicated in *D. bagiloana,* whilst of *D. kigogoana* Stephenson mentions only that "the seminal grooves are straight, bordered by faint lips." The complex configuration of the male field in *D. bagiloana* resembles the rather more complicated figure of the male field in *D. ficta* Michaelsen (1934, p. 26, fig. 14) from the Belgian Congo. The male field of this species also exhibits some longitudinal furrows, one of which lies in the median-ventral line; in other respects, however, the species from the Belgian Congo is very different from *D. bagiloana.*

Dichogaster elgonensis sp. nov.

Three somewhat softened specimens, from Kaburomi (about 1°15′ north lat., 34°30′ east long.), 10,500 feet, western slope of Mount Elgon, Uganda. 28.xii.33.

External Characters. Length about 90 mm., diameter 2–3 mm. segments about 140.

Colour dark, dirty gray (possibly not the original colour).

Head pro-epilobous, with a minute, roundish dorsal appendage invading segment I.

Setae slender, strictly paired, decidedly ventral in position, the

median-dorsal distance equalling about three-quarters of the circumference of the body, the median-ventral distance is slightly greater than the middle lateral (*aa* 7 *bc*, *dd*=¾*μ*, approximately).

Clitellum occupying segments XIII–½XXI (=8½), inclined against the intersegmental furrow XII/XIII as well as against the middle zone of segment XXI, annular only at segment XIV, interrupted ventrally in the rest, the interruption being broader at segments XIII and XXI.

Male sexual field (fig. 3) bilaterally symmetrical. Two pairs of prostate pores at segments XVII and XIX in the line of a pair of ventral setae, *ab*, those of either side united by a nearly straight,

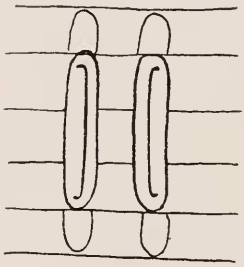

Fig. 3. *Dichogaster elgonensis*. Male sexual field.

longitudinal seminal furrow which is slightly bent at the extremities, convex against the median line. Each seminal furrow is closely flanked by a pair of rather narrow walls which unite after bending round the prostate pores. The terminal ends of such a pair of walls are continued forwards and backwards upon the neighbouring segment (XVI and XX) into a somewhat less prominent, not sharply bordered glandular field.

Spermathecal pores indistinct, 2 pairs in the intersegmental furrow VII/VIII and VIII/IX in the line of the ventral pairs of setae *ab*.

Internal Anatomy. Septa IX/X–XIII/XIV thickened, XI/XII and XII/XIII strongly, X/XI and XIII/XIV moderately, IX/X slightly, the remaining septa very thin.

Alimentary canal. Two large gizzards in segments V and VI; 3 pairs of chylous pouches, broadly ridged in segments XV, XVI and XVII, relatively long, bean-shaped, somewhat irregularly incised at the convex borders, occupying the entire flanks of the oesophagous within the range of those three segments, those of a pair nearly meeting each other in the median-dorsal and median-ventral line of the oesophagus.

Only the chylous pouches of the first pair in segment XV discharge separately by means of an individual, short and narrow, tubular stalk. The stalks of the posterior pouches in segment XVII are bent forwards into segment XVI, and unite with the stalks of the middle pair. The intestine bears a simple, smooth, ridge-like typhlosolis.

Fig. 4. *Dichogaster elgonensis.* Ectal part of a penial seta. x 140.

Michronephridia in the anteclitellian part of the body small and numerous, in the postclitellian portion more or less large, flattened, sac-shaped, rather constantly 4 in each half of a segment.

Anterior male organs holoandric. Two pairs of testicles ventrally in the anterior parts of segments X and XI, enclosed in the narrow basal parts of thin-walled, pyriform, testis sacs which extend as far as the dorsal part of their segment and are crowded with masses of

developing sperm. I failed to recognise seminal vesicles but would hesitate to assert that such organs were absent.

Posterior male organs. Two pairs of equally large prostates in segments XVII and XIX. Glandular part cylindrical, about 0.25 mm. thick, very long, irregularly coiled, with smooth, yellowish-white surface; duct tubular, uniformly thick (about 0.1 mm.) throughout its length, moderately long, sharply set off from the glandular part, discharging in a simple manner through the prostatic pore. Penial setae (fig. 4) uniform, about 1.9 mm. long, at the ental end 45μ, in the centre 25 μ and just before the ectal end 12 μ thick, very slightly and simply bent; the ectal half with the exception of the terminal part shows a slight undulation causing only about five moderately prominent waves at the profile-lines of the seta; in height these waves are equal to about a quarter of the width of the seta. The ectal tip of the penial seta is simple and moderately sharply pointed; ornamentation of this seta is restricted to its ectal half, differing in appearance in various parts of the seta, commencing with a small tract beneath the ectal tip of a relatively large, triangular thorn, rising out of the ental part of a not very distinct scar, and bent off from the seta so as to project considerably above the profile line of the seta. The subsequent ornamentation is somewhat distant from the first mentioned as well as from one another and is somewhat irregularly arranged. Proceeding entalwards, the ornaments alter in appearance successively, the thorns become smaller, shorter and finally quite indistinct; meanwhile the scar, from which the thorn rises, becomes more distinct, longer and deeper in its now sharply bordered ental end; these scars devoid of thorns, or at least without noticeable thorns, are situated at the ectal slope of the above-mentioned undulations of the seta.

Spermathecae (fig. 5) two pairs of equal size. Ampulla rather small, inverted pyriform, much shorter than the duct and middle part together; middle part sharply set off from the ampulla, about half as thick (fig. 5*a*), if not somewhat swollen (fig. 5*b*), about as long as the muscular duct, from which it is not at all, or at least not sharply set off. A single pyriform diverticulum arises beside the middle part and the ectal half of the ampulla. The swollen ental half of the diverticulum is directed upwards, parallel to the main part of the spermatheca against which it is inclined. It contains a single oval sperm compartment filled with spermatozoa. The ectal half of the diverticulum is a narrow tubular stalk of which the basal part is bent upwards and discharges rather high up in the middle portion of the spermatheca not very far from the entrance into the ampulla. This relation of the

diverticulum to the other parts of the spermatheca cannot be seen directly, as the basal part of the diverticulum is covered by a tissue which slopes equally upwards against the sperm compartment of the

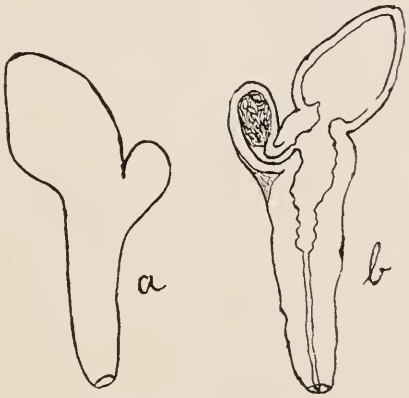

Fig. 5. *Dichogaster elgonensis.* Spermathecae of two different specimens: *a* with contracted middle portion, *b* with swollen middle portion, the first only in outline, the latter made transparent.

diverticulum and downwards against the muscular duct of the sper-. matheca; these organs and their relative positions can only be recognised properly in cleared preparations (fig. 5*b*) and in slides of longitudinal sections.

Dichogaster kaburomina sp. nov.

Several well-preserved adult and immature specimens, from Kaburomi (about 1°15′ north lat., 34°30′ east long.), 10,500 feet, western slope of Mount Elgon, Uganda. 28.xii.33.

External Characters. Length about 90 mm., diameter 4½–5 mm., segments about 155.

Colour light yellowish red, a little more intensive at the clitellum, with dusky mottling at the middle and hinder part of the body, the light nephridia and the dark contents of the intestine showing through the semi-transparent body wall.

Body cylindrical only in its anterior part, slightly depressed behind the clitellum.

Head epilobous (about ½), lateral borders of the dorsal appendage converging posteriorly, uniting here so as to form a narrowly rounded hinder end of the appendage. Segments of the anterior portion of the body triannulate.

Setae very slender, strictly paired, median-dorsal distance occupying about two-thirds of the circumference of the body (*aa*=*bc; dd*=⅔ *u*, approximately), median-ventral distance a little greater than the middle lateral distances.

Dorsal pores only distinguishable behind the clitellum.

Clitellum annular, occupying segments XIV–XX (=7), occasionally, though not in all specimens, less developed ventrally.

Male sexual field bilaterally symmetrical, biscuit-shaped, a little longer than its maximum breadth median-ventrally at segments XVII–XIX, laterally extending a little over the lines of setae *b;* its contour, broadest at segments XVII and XIX, smallest at segment XVIII; it is marked laterally, though sometimes indistinctly, by a rather flat and broad wall. The 2 pairs of prostate pores occupy the 4 corners of the male field at segments XVII and XIX in the line of the innermost pairs of setae, *ab.* The seminal furrows connecting the two pores of each side, and close to the median side of the lateral walls, are deeply curved in a medial direction in the range of segment XVIII, being adapted to the curvature of the lateral walls. I failed to distinguish the male pores.

Spermathecal pores, 2 pairs at the intersegmental furrows VII/VIII and VIII/IX in the line of the setae *ab.*

Internal Anatomy. Septa V/VI–IX/X very thin, X/XI–XIII/XIV somewhat thickened, XIV/XV slightly thickened, those following very thin.

Alimentary canal. Two large gizzards in segments V and VI. 3 pairs of chylous pouches in segments XV, XVI and XVII, are rather large, approximately equal, longish bean-shaped, occupying the whole length of the oesophagus in these three segments. The intestine bears a simple, irregularly zigzag, ridge-like typhlosol.

Micronephridia in the anticlitellian segments small, irregularly scattered rather large in the postclitellian segments, sac-shaped, mostly with a rounded-quadrangular contour; usually 5 or 6, rarely 7, micronephridia in each half of a segment, 7 only when the lowest nephridium is replaced by two smaller ones.

Anterior male organs holoandric. Testicles indistinguishable; 2 pairs of testis sacs in segments X and XI, these large pear-shaped sacs extending far into the dorsal region of their segment, the broad, lower

parts of each pair united ventrally, containing a pair of large male funnels in the posterior part, and presumably the testicles in the anterior part. The two male funnels of one segment are not distinctly separated from one another; 2 pairs of moderately large seminal vesicles depend from the septa X/XI and XI/XII into segments XI and XII, those of the anterior pair in segment XI enclosed in the testis sacs of the anterior pair, those of the posterior pair free in the body cavity of segment XII; these seminal vesicles are broader than long, grape-shaped, the somewhat small berries being closely crowded.

Posterior male organs. Two pairs of prostates in segments XVII and XIX, laterally attached to the intestine; glandular part yellowish, very long, tubular, about 0.5 mm. in diameter, more or less broadly convoluted, the adjacent bends pressed against each other; duct very much shorter but relatively long, very thin throughout its length, about 0.1 mm. in diameter; each prostate accompanied by a penial-seta-sac, each of which contains some penial setae, one that was closely examined held 5. The setae of one penial sac are of very different size and shape. At first I believed that this was a case of dimorphism such as is known in some species of this genus, a careful examination, however, convinced me that the difference depends upon the stages of development. In many mature specimens of *D. kaburomina* penial setae were protruded but only one at each prostate pore and always that one of the largest size, not 2 dimorphic ones, such as may be found protruding side by side in species with true dimorphic setae. A fully grown penial seta of *D. kaburomina* (fig. 6*a*) is about 1.6 mm. long, in the middle about 60 μ thick, broadened at the ental end to about 85 μ, and gradually diminishing towards the ectal end to a diameter of about 36 μ a short distance beneath the ectal end, nearly straight in the middle, moderately and equally curved in the ectal fourth, slightly curved in the same direction at the extreme ectal end. The ectal end is moderately sharply and simply pointed. The ectal half of this seta shows a characteristic ornamentation consisting of some short, triangular teeth which are broad at their bases. These teeth occupy the ental end of small scars, and project distinctly above the profile lines of the seta; they are arranged irregularly and well separated from each other; in number there may be as many as 10 or 12; towards the middle of the seta they become very small and indistinct. Besides this external ornamentation the setae show a certain interior structure consisting of a very delicate and dense annulation which in no way alters the smoothness of the surface of the profile lines of the setae (fig. 6*b*). One of the smaller setae of the same

seta-sac (fig. 6*c*), the only one which I could examine in an uninjured state, is 0.95 mm. long and in the middle 35 μ thick, straight in nearly all its length, only slightly bent at its ectal tip. It is quite smooth without any ornamentation but internally exhibiting the same annulation.

Female organs. A pair of very large ovaries depend from the ventral margin of septum XII/XIII into segment XIII.

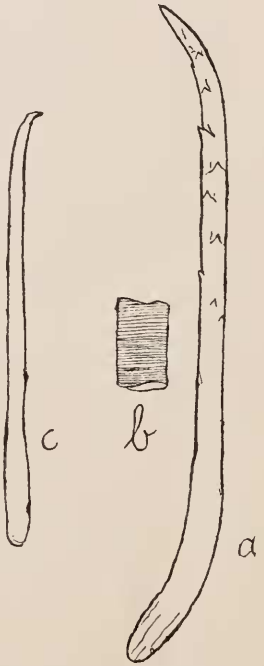

Fig. 6. *Dichogaster kaburomina.* Penial setae. *a* a fully developed one, x 60, *b* middle part of the same, x 120, *c* an unfinished one of the same bundle, x 60.

Spermathecae (fig. 7). Ampulla rather small, pear-shaped or nearly cylindrical, with a thin smooth wall, ampulla connected with the middle portion of the spermatheca by a short and very narrow neck, it always seems to be bent aside; median portion is longer than the ampulla and either distinctly thicker than the latter, just as thick, or even a little thinner, according to whether it holds a thecacystis or not; wall of the middle portion moderately thick, mainly smooth, but at its ental part near the ampulla it is provided with some ring-shaped

edges narrowing the lumen; the muscles of this middle portion are not noticeable; the muscular duct of the spermatheca is somewhat shorter than the middle portion and somewhat, if not much, thinner, moderately sharply set off from it with narrow, smooth, axial canal. A diverticulum, about half as long as the middle portion, discharges into the ectal part of the middle portion against which it is inclined. I have examined the diverticula of two specimens, only two of these eight diverticula (one from each specimen) are simple pear-shaped with a

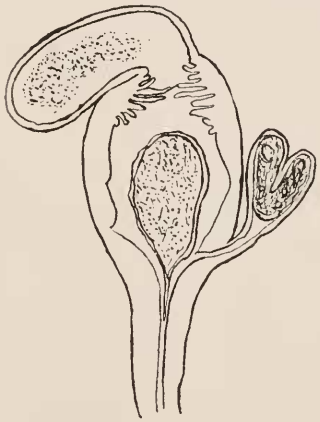

Fig. 7. *Dichogaster kaburomina.* Spermatheca made transparent.

short narrow duct and containing a simple sperm ball; in five of the other diverticula the broad blind end was more or less deeply cleft, the contour of the diverticulum became heart-shaped. The sperm space also is paired, the two parts of it being separated from each other over a more or less lengthy tract, frequently for nearly their entire length. In one of the diverticula examined there is a third sperm space in addition to the two already mentioned. This, however, is not placed in the plane of the others but is situated somewhat lower and nearer to the common stalk of the diverticulum; in the 4 spermatheca of one specimen which had a narrow middle portion, the latter were empty, in the spermathecae of another worm with a broader middle portion, the latter held a thecacystis with a large, oval, almost globular head and a short, narrow tail extending into the ectal part of the narrow axial canal of the muscular duct.

Subfamily OCNERODRILINAE

Genus Gordiodrilus

Gordiodrilus wemanus sp. nov.

Many well-preserved adults and young, from Wema (about 2°30′ south lat., 40° east long.), Ngatana district, Tana River, Kenya Colony.

External Characters. Length 35–45 mm., diameter 1.0–1.2 mm., segments about 120.

Colour uniformly brown, scarcely darker above than below.

Body cylindrical with rather smooth surface; intersegmental furrows in general rather indistinct, but somewhat better defined on the anterior portion of the body.

Fig. 8. *Gordiodrilus wemanus.* Dorsal view of the head.

Head (fig. 8) epilobous (about ½). Prostomium broad and rather short, uniformly rounded; dorsal appendage of the prostomium broad, narrowing posteriorly, with two narrow, transverse furrows near each other, and near the hinder edge of the appendage, the converging lateral borders of the appendage reaching only a very little distance (sometimes not at all ?) over the hindmost furrow.

Setae rather strictly paired, the lateral perhaps a little more so than the ventral, the difference scarcely noticeable; median-ventral distance a little smaller than the middle lateral ones, median-dorsal distance in general equalling half the circumference of the body (approximately *aa: ab: bc: cd: dd:*=8: 3: 9: 3: 37; *dd*=½ *μ*); towards the clitellar region the setae appear to be very slightly dislocated in a ventral direction, not so much so, however, as that the lateral ones could be called ventral. The setae are moderately large, the ventral very little larger than the lateral, but this difference is slight.

Clitellum annular, occupying segments XIV–XIX (=6), but becoming indistinct towards the intersegmental furrows XIII/XIV and XIX/XX.

Male sexual field nearly quadrate extending medio-ventrally between the intersegmental furrows XVI/XVII and XVIII/XIX, laterally extending very little over the lines of setae *b*, in general somewhat prominent, laterally distinctly bordered by a pair of straight, smooth, longitudinal walls which sometimes are marked by a lighter colour. 2 pairs of prostate pores in the middle zone of segments XVII and XVIII in the lines of setae *b* in the centre of more or less distinct circular porophores which occupy nearly the entire length of their segment. The prostate pores of each side are connected with one another by a straight, longitudinal, seminal furrow running exactly midway between the bordering lateral walls. At the points where the seminal furrows cross the intersegmental furrow XVII/XVIII, or very near this point, the male pores lie in the bottom of the furrows; they are very indistinct and could be recognised only in very thin horizontal slides.

Spermathecal pores, 2 pairs ventrally at the intersegmental furrows VII/VIII and VIII/IX, invisible exact in the lines of setae *b*.

Internal Anatomy. Septa V/VI–X/XI thickened, X/XI slightly, V/VI and IX/X a little more, VI/VII–VIII/IX rather strongly.

Alimentary canal. Oesophagus narrow, without a gizzard or any muscular thickenings, the masses of chromophil cells (pharyngeal glands) extend backwards to segment VIII; an unpaired chylous pouch depends ventrally from the oesophagus in the posterior part of segment IX. It is ovate, unstalked, only slightly narrowed at the base, composed of very numerous, parallel, thin, chylous tubes; a rather narrow axial lumen leads from the lumen of the oesophagus almost into the middle of the chylous pouch. In the anterior part of segment XIII the narrow oesophagus suddenly swells to form the wide intestine which has no typhlosole.

Last heart in segment XI.

Nephridia beginning in segment V; in the anteclitellar segments the nephridia are very small and slender, in the middle and posterior part of the body they are extensively covered by large, opaque, and very granular cells.

Anterior male organs. Two pairs of testicles depend free from the ventral border of septa IX/X and X/XI into the coelom of segments X and XI. Opposite to them and anterior to septa X/XI and XI/XII are two pairs of rather small male funnels; the male ducts, not distinctly seen, seem to be very tenuous, those of one side obviously are united before discharging through their male pore, their extreme ectal end, in the body wall above the male pore, is seen in horizontal sec-

tions as a very narrow, quite simple tube. 2 pairs of seminal vesicles depend from septum IX/X into segment IX and from septum XI/XII into segment XII; those of the anterior pair are rather large and multiple, consisting of a few irregularly pyriform sacs, those of the posterior pair in segment XII are rather small, normal sacs.

Posterior male organs. Two pairs of very long, slender prostates occupy the ventral parts of some segments from XVII backwards. The glandular part of the prostates is loosely coiled, occupying the ventral part of two or three segments; it is about 0.07 mm. thick and consists mainly of a thick glandular epithelium; the axial lumen is a very narrow channel. There are no remarkable muscles at this part; ectally the glandular part gradually narrows to the muscular duct which is irregularly bent, rather short and about 0.04 mm. in diameter at the centre; it becomes still narrower where it enters the body wall and discharges in a quite normal manner at the top of its porophore.

Spermathecae (fig. 9). Ampulla small, elongate oval, or inverted pyriform, its walls smooth and moderately thick, duct rather sharply set off from the ampulla, twice to thrice as long. In the ental two thirds it is about half as thick as the ampulla, in the ectal third it gradually narrows towards its ectal end. The lumen is a simple, narrow, straight channel only in the narrower ectal third of the duct, in the ental two-thirds of the duct is narrowly meandering or forms irregular spiral turns; it is invested by a moderately thick, but not quite uniformly thick epithelium which follows the meanderings and convolutions of the lumen in a lesser degree; on its exterior side the epithelium is covered by a moderately thick muscular layer which is smooth on the outside, this again bears on the outside a layer of very small, nearly globular glandular cells, a layer of unequal thickness, in places scarcely noticeable, especially thin at the ectal end of the duct, elsewhere moderately thick, imparting a certain roughness to the surface of the duct. There are no diverticula leading off from the lumen of the duct.

Remarks. G. wemanus belongs to the group *G. zanzibaricus* Beddard (1894, p. 252), *G. habessinicus* Michaelsen (1913, p. 5, pl. ii, figs. 30–31) and *G. baski* Stephenson (1928, p. 1, text fig.) characterised by the situation of the prostatic pores — 2 pairs at segments XVII and XVIII. *G. zanzibaricus* differs from all the others by the situation of the setae, which "are all of them decidedly ventral in position," whilst in the others the median-dorsal interval equals half the circumference of the body, it is not even a little less, as in *G. habessinicus*. The rest of the description of *G. zanzibaricus*, especially in respect to the structure of

the spermathecae, is so incomplete that one cannot state what is its relationship to other species. *G. wemanus* agrees with *G. habessinicus* in having the median-ventral interval between the setae smaller than the middle lateral ones, in *G. baski* it is greater than the latter, in *G. zanzibaricus* equalling it. A character found only in *G. wemanus* is the possession of a second pair of seminal vesicles depending from sep-

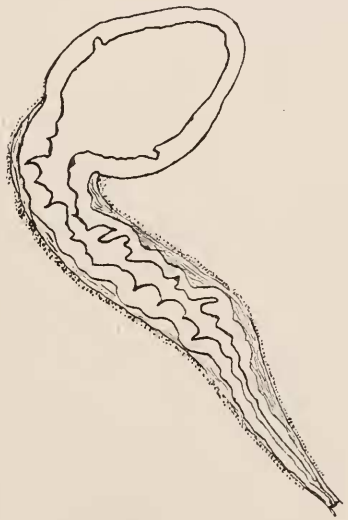

Fig. 9. *Gordiodrilus wemanus*. Spermatheca, made transparent.

tum IX/X into segment IX; in the other species of the group there is only one pair depending from septum XI/XII into segment XII. As for the structure of the spermathecae, *G. wemanus* differs from *G. baski* and *G. habessinicus* in the absence of diverticula leading off from the lumen of the duct.

It is possible that *G. elegans* Beddard (1892, p. 84), with prostatic pores at segments XVIII and XIX, should be placed near to *G. zanzibaricus* group, as it is the only other *Gordiodrilus* provided with diverticula in the spermathecal duct.

Family EUDRILIDAE

Genus Bettonia

Bettonia monticola sp. nov.

Two adult and an immature specimen, from Kaburomi (about 1°15′ north lat., 34°30′ east long.), 10,500 feet, western slope of Mount Elgon, Uganda. 28.xii.33.

Paratypes from Amaler River (about 1°50′ north lat., 34°40′ east long.), 5,000 feet, western slope of Mount Debasien, Karamojo, Uganda. 14.xi. 1933.

External Characters. Length of adults 73–85 mm., diameters 3¾–4 and 4–4½ mm., 115 and 145 segments. (Contrasted with *B. lagariensis* Beddard, (see *Remarks*) which was 90 mm. long with a diameter of from 4–5 mm., it is slightly smaller).

Colour bluish violet dorsally, the remainder yellowish gray.

Body cylindrical anteriorly and somewhat depressed in the middle and posterior portion.

Head epilobous (about ½).

Setae in general moderately large; those of segment XII and of some preceding it, especially the ventral ones, somewhat enlarged, the ventral setae of segments XIII, XIV and XVII smaller than the normal ones. In general the median-ventral distance is only slightly larger than that between the setae of the ventral pair and about as large as the middle lateral distances, the dorsal pairs are about 3/5 as wide as the ventral ones, the median-dorsal distance seems to be slightly smaller than half the circumference of the body (impossible to measure accurately as the body wall is somewhat shrivelled into longitudinal folds); against segment XVIII the ventral setae are distinctly dislocated medially at the expense of the middle lateral distances, so much so that at segment XVIII the median-ventral distance equals the width of the ventral pairs, and is smaller than half the median lateral distances (in general *aa: ab: bc: cd*=8: 6: 8: 4; at segment XVIII *aa: ab: bc: cd*=4: 4: 9: 3; *dd*=½μ?). Of *B. lagariensis* Beddard only remarks that "the setae are wider apart in the case of the ventral couples than in the case of the lateral." He does not state that the setae of the ventral couples are remarkably distant from one another, and in fig. 36 of *B. lagariensis* at segment XVI they are indeed shown as hardly half as far from one another as the median-ventral distance. More anteriorly the ventral couples are even narrower, at segment VI for instance *ab* is hardly 1/3 as large as *aa*, as the setae are, for the most

part, rather large in this region of the body, I dare not assume that their very characteristic arrangement in *B. monticola* could have escaped notice in *B. lagariensis*.

Clitellum apparently annular but ventrally showing a somewhat different glandular modification. It occupies segments XIV–XVIII but is only weakly developed in segment XVIII.

Secondary male pore unpaired, situated medio-ventrally at intersegmental furrow XVII/XVIII, a great hole with notched margin expanding between the lines of setae *a*, and with a rounded triangular contour, the anterior angle extending over the posterior part of segment XVII.

Spermathecal pores, 1 pair at the intersegmental furrow XII/XIII, their middle part just in the lines of setae *b*.

External organs of puberty: A lighter coloured, slightly prominent, not sharply edged, glandular cushion around the male pore, more distinct in its hinder semicircular part at segment XVIII than in its rounded square anterior part at segment XVII; a somewhat more prominent, transverse cushion ventrally on the forepart of segment XIII behind the spermathecal pores.

Internal Anatomy. Septa VIII/IX–X/XI greatly thickened, VII/VIII and XI/XII moderately, VI/VII and XII/XIII slightly thickened, those following, as well as septum V/VI, very thin.

Alimentary canal. A large barrel-shaped gizzard in segment V, 3 oval, unpaired, short-stemmed chylous pouches, tubule pouches, depend ventrally from the oesophagus in the posterior parts of segments IX, X and XI, a pair of lateral chylous pouches which are broadly ridged, discharge into the oesophagus in segment XIII. Intestine without a typhlosole.

Anterior male organs holoandric. Testicles unrecognizable. The sperm reservoirs are thin tubes closely and irregularly coiled, empty and apparently collapsed in the specimen examined; two pairs of large broadly sac-shaped multilocular seminal vesicles depend from the septa X/XI and XI/XII into segments XI and XII.

Posterior male organs. Glandular part of the euprostates thickly tubular, about 4½ mm. long and 0.9 mm. thick, the ectal two-thirds running straight backwards, the ental third bent forward, closely attached to the ectal part. Glandular part smooth externally, covered by a thin muscular mantle about 50 μ thick; glandular epithelium irregularly thickened, in some places forming ridges as thick as 250μ, in other parts much thinner, in consequence the lumen is correspondingly irregular, tending to form zigzag bends which are, in general,

rather narrow. At its ectal end the glandular part of the euprostate is continued into a short muscular duct, about 0.45 mm. in diameter, which enters the hind pole of a large, oval, cushion-like, copulatory pouch about 2½ mm. long and 2 mm. broad. The longer axis of the two pouches converge against the median secondary male pore through which they discharge, their anterior poles being united. The wall of a copulatory pouch is very muscular, irregularly thick, the moderately wide lumen being narrowed by large ridges and walls. At the hinder pole of the copulatory pouch; a moderately large and conical penis projects into the lumen; this penis has a narrow, smooth, axial canal which is a continuation of the euprostate canal and discharges through one of the primary male pores at the top of the penis. The vasa deferentia coming from the anterior male organs enter side by side the euprostate at the ental end of its muscular duct, then bend and turn ectalwards to the muscular layer of the euprostate duct and penis. Here the two vasa deferentia of the corresponding side of the body obviously unite, for in the length of the penis I could recognise only one narrow channel near the axial channel of the penis (from the external view of the posterior male organs of *B. lagariensis* as figured by Beddard (1903, fig. 37) we may assume that their internal structure is essentially similar to that of *B. monticola*); in the act of copulation doubtless the two copulatory pouches will be pushed out with the result that the two extended penises will diverge from each other sufficiently to enable them to enter the two spermathecal pores so far distant from one another.

Female organs and spermathecae in general symmetrically paired, the two connected with each other by a supraoesophagial coelomic tube. The apparatus of one side exhibits the following structure. The spermathecal pore leads into a stoutly pyriform, though slightly narrowed in its ectal portion, spermatheca with a rather narrow, irregular lumen and a very thick muscular wall. The spermatheca lies not quite freely in the body cavity of segment XIII, at least its broader ental part is enveloped by a very delicate membrane, which, I suppose, is part of an ovarian bladder which in the meantime envelops the female funnel. (I could not recognise this envelopment at the basal part of the spermatheca). The lumen of the spermatheca seems to end blindly, no definite opening into the ovarian bladder being recognisable, but in the thick wall of the ental pole of the spermatheca irregular narrow fissures were detected some of which certainly opened into what is presumably the ovarian bladder. (The passage of the spermatozoa from the spermatheca into the female

apparatus obviously resembles that recognised by Michaelsen (1905, p. 343) and by Cognetti (1910, p. 4 and fig.) in certain species of the genus *Pareudrilus*). A very slender, club-shaped, thin-based ovarium arises from the hinder side of the ventral part of septum XII/XIII slightly above its ventral margin and somewhat medially from the base of the spermatheca. It extends parallel with, and as far as the ental pole of the adjacent spermatheca; it is closely enveloped by a thin membrane, forming the tubular part of an ovarian bladder. This bladder, on reaching the ental end of the spermatheca, bends sideways inclining closely against the ental pole of the spermatheca with whose membranous covering it apparently coalesces (I was unable definitely to determine the relationships of these delicate membranes). Meanwhile the ovarian bladder, if I recognised it rightly, widens and envelops the female funnel also, the latter being closely attached to the spermatheca; there is then given off from the lateral portion of the ovarian bladder, a thin tubular continuation which, rising beside the oesophagus to which it is closely attached, enters into the dorsal part of segment XIII; on reaching the median-dorsal line of the oesophagus, this tube unites with that arising on the other side, the two together forming an unpaired coelomic tube which, encircling the oesophagus, connects both the female apparatuses. At the median-dorsal middle of this coelomic tube, it gives rise to a very small, blind sac which extends backwards for a short distance beside the dorsal vessel to form a small, unpaired coelomic sac; the pyriform, closed female funnel is rather closely attached to the ental part of the spermatheca and is apparently enclosed in the ovarian bladder; its broad, median pole appears to open by a narrow slit into the ovarian bladder. Its lumen is rather narrow and not quite simple. A narrow channel leaves its median part obliquely in a latero-posterior direction into the narrow and short stalk of a rather large, kidney-shaped egg sac whose base covers the posterior part of the female funnel. The narrower, lateral pole of the female funnel is continued into a slender female duct, which first proceeds sideways then bends backwards to reach the female pore at the intersegmental furrow XIV/XV. At the ental end of the female duct approximately at the ectal end of the female funnel, arises a moderately large, pyriform appendage which contains a moderately large, apparently not quite simple sperm chamber (Respecting *B. lagariensis*, Beddard's solitary noteworthy detail regarding these organs is that the muscular, basal part of the spermatheca is enveloped in a coelomic sac).

Remarks. It is with some hesitation that I describe these worms

as a new species, for in some respects they show a remarkably close resemblance to Beddard's *B. lagariensis* (1903, p. 213, figs. 36–37) from Lagari, Mau District, south of El Burgon Range, Kenya Colony, a locality about 150 miles southeast of the type locality of *monticola*. It might be better to consider my specimens as representing a race of *lagariensis*, but unfortunately the description of *B. lagariensis* is so incomplete that one cannot tell whether great differences exist in the organs not mentioned by Beddard. In any event there is a considerable difference in the arrangement of the setae between my specimens of *monticola* and those of *lagariensis* as shown in Beddard's fig. 36, which I dare not ascribe to errors of the English draftsman. In the foregoing description of *monticola*, other important differences between the two worms are noted in addition to omissions in Beddard's description.

B. monticola differs from the nearly related *B. adolphi-friderici* Michaelsen (1910, p. 62) principally by the structure of posterior male organs and of the female apparatus. In *B. adolphi-friderici* the copulatory pouches are distinctly separated, each discharging by means of a proper duct through the common secondary male pore, the glandular part of the euprostate is irregularly bent and does not form a single loop as in all other known species of this genus. The spermatheca in *B. adolphi-friderici* is shorter and broader than in *B. monticola*, all the female organs of the former are situated nearer to the base of the spermatheca than in the latter, while the ovarium with its ovarian bladder has quite a different shape to that of the *new* species.

B. budduensis Michaelsen (1910, p. 66) differs from all other known species of *Bettonia* in having the spermathecal pores situated in the lines of setae *b*.

Genus Polytoreutus

Polytoreutus loveridgei sp. nov.

Two specimens, of which the larger is designated as the type, from Golbanti (2°27′ south lat., 40°7′ east long.) on the Tana River, Kenya Colony. 22.vi.1934.

External Characters. Length of type 140 mm., diameter throughout about 4½ mm., segments about 250. Length of paratype 90 mm., diameter 2½–4, segments about 175. Both specimens seem to be entire.

Colour of type in general smokey gray, of the paratype dark gray but chamois or approximately brown at the clitellum.

Body cylindrical.

Head prolobic, segments more or less distinctly triannulate.

Setae rather slender, especially anteriorly; at midbody $aa = 1\frac{1}{2}\ ab = 1\frac{1}{2}$: $bc = ca\ 5\ cd$; $dd = \frac{1}{2}\mu$.

Nephridiopores in the lines of setae *cd*.

Clitellum at segments XIV-XVII, annular; intersegmental furrow somewhat more tenuous though still distinct at the clitellum; nephridiopores rather more distinct at this point.

Secondary male pore situated medio-ventrally at intersegmental furrow XVII/XVIII at the summit of a transversely oval cushion which extends as far as the middle zones of segments XVII and XVIII. In the type a stump-like, cylindrical penis, somewhat longer than thick, and bearing the primary male pore at its summit, projects from the secondary male pore; in the paratype the penis is retracted so far that its primary male pore is on a level with the surface of the porophore.

Spermathecal pore concealed in a very slender transverse slit medio-ventrally at intersegmental furrow XVIII/XIX.

Internal Anatomy. In view of the fact that the anatomical characteristics of the anterior end are quite uniform in this genus, and in an endeavour to avoid mutilating the type, I have not dissected the region of the head, but confine my observations to the following. Septum XII/XIII is the last one somewhat thickened; a pair of stout, kidney-shaped, chylous pouches (ridged pouches with accretions of calcium carbonate) depend from the oesophagus in segment XIII. Intestine without a typhlosole.

Anterior male organs. A pair of seminal vesicles extend backwards through many segments posterior to septum XI/XII. Throughout their length they are closely attached to the alimentary tract, in the type as far as segments XXVI and XXVII, in the paratype as far as XXVII. In the type these seminal vesicles are closely attached to one another throughout their length except anteriorly; in the paratype they are separated except for some short tracts. Where separated, the vesicles have the shape of flattened rosaries, being swollen in the segmental areas and constricted sharply at the intersegments. Each individual bead of this rosary represents a flattened oval, being somewhat shorter than broad. In the type where the two seminal vesicles are closely attached to one another the swellings of the joints are only developed on the free side, at such a spot the double organ has the appearance of a flattened rosary divided longitudinally by a median cut.

Posterior male organs (fig. 10). A pair of euprostates pass from the medio-ventral male pore first sideways, then upwards and backwards through 3 or more (till 7) segments. Their glandular, ental part (*eu*) is sausage-shaped, about 11 mm. in length and at the ectal end *ca* 0.9 mm. thick, entalwards slightly diminishing in thickness, simply and more or less irregularly bent, closely attached to the intestine. Its wall is rather thick, consisting principally of long, slender, glandular cells placed vertically against the outer surface which is provided sparsely with muscle fibres; lumen moderately wide, somewhat reduced by 4 or 5 irregular, longitudinal ridges which project into it. In a

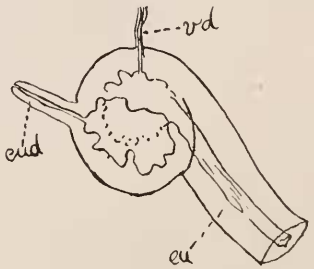

Fig. 10. *Polytoreutus loveridgei.* Ectal part of an euprostata with the ectal end of the relative vasa deferentia and the muscular euprostata duct.

transverse section its contour is very irregularly stellate. The ectal end of the glandular part is modified in a very characteristic manner; in the organ viewed "in toto" it looks like a somewhat flattened bulb which is nearly twice as thick as the unmodified euprostate tube from which it is sharply distinguished, at least posteriorly, less distinctly or not at all anteriorly. As viewed in a series of sections it appears somewhat different in the two specimens. In the cotype (fig. 10) this bulb appears as a somewhat widened continuation of the euprostatic tube which is curved to form a short, narrow, S-shaped, double loop only marked externally by a very slight furrow; walls and ridges of the main portion of the euprostate tube are continued into this modified terminal part where their regular longitudinal arrangement gives place to a very irregular one. The vas deferens (*vd*) reaches the bulb on the anterior side of its first or ental turn, its axial channel, piercing the wall of the bulb in a straight vertical line, discharges into the lumen in a quite simple manner. At the ectal pole of the ectal turn of the double loop arises the short, narrow, euprostate duct (*eud*) which is

almost entirely embedded in the body wall. In this region the internal surface of the rather compact and muscular body wall is quite plain without any internal thickenings, no copulatory pouch is formed. At this point the euprostate duct unites with its partner from the other side to form a single, unpaired, penial duct which contracts into some narrow, short loops and terminates in a short, free, conical penis surrounded by a narrow lumen. The rather compact male porophore

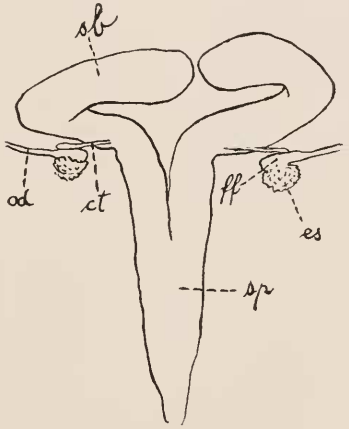

Fig. 11. *Polytoreutus loveridgei.* Female organs and spermatheca.

forms, in its exterior part, a small penis pouch that is almost entirely filled by the penis. The primary male pore at the top of the penis is just level with the surface of the male porophore. In the type, however, the ectal part of the euprostatic apparatus has a somewhat different appearance: the ectal tract of the glandular part looks more like a simple, nearly elliptical bladder, the S-shaped double loop of the cotype is rendered indistinct, presumably by inflation, its lumen is rather wide at this spot and completely filled with fine granular secretions while the corresponding part of the presumably contracted paratype is quite empty.

Female organs and spermathecae (figs. 11–12). I could not recognise ovaries or ovarian bladders. The spermathecal pore at intersegmental furrow XVIII/XIX leads into an unpaired flattened tube (*sp*) which is anteriorly very narrow, then broadens to about 0.65 mm., is closely attached to the body wall and leads straight forwards to bifurcate at segment XVI. The two branches (*sb*) which are about as broad as

the unpaired posterior tube are at first closely attached to one another but later diverge widely. On reaching segment XIII the two branches bend sideways, upwards, and finally mediad, embracing the alimentary canal in the region of the paired chylous pouches; on the dorsal side of the oesophagus they meet without coalescing; the branches are stoutly club-shaped. The whole spermatheca and its branches have

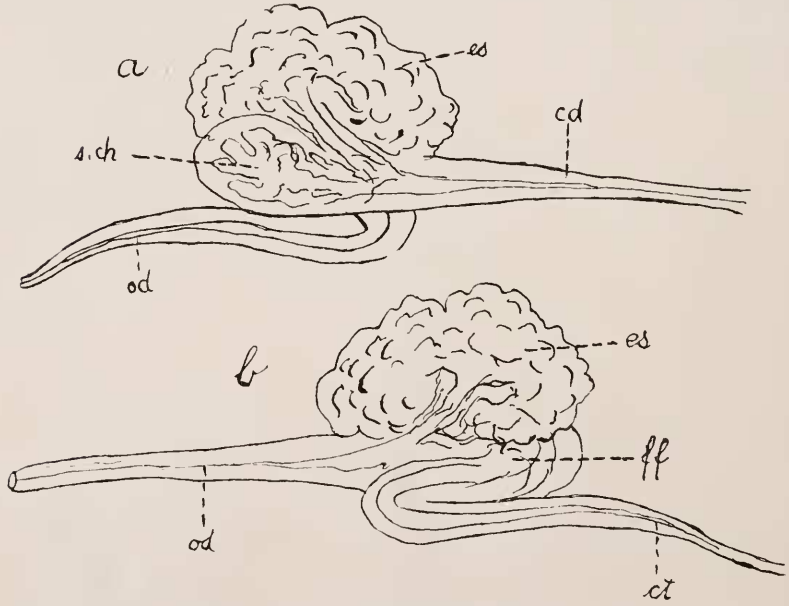

Fig. 12. *Polytoreutus loveridgei*. Female apparatus of the right side, *a* and *b* seen from different sides.

a rather thin wall and wide lumen; this lumen is filled with fine and evenly granular secretions, coloured light red in haematoxylin-eosin. In these secretions many slender, cylindrical, irregularly bent or curved, rather long (some fragments being about 0.3 mm. long), in places densely crowded spermozeugmas are embedded. Their structureless, light red axial portion is 18 μ thick, totally covered by the spermatozoan head-ends which are dark violet, almost black, and form a dense layer of about 6 μ thickness; the entirely pale caudal ends of the spermatozoa project freely into the mass of secretions. The indis-

tinct female pores each lead into a slender, straight oviduct (*od*) which, passing mediad, enter an irregularly pyriform, rolled or closed female funnel (*ff*) whose narrow lumen is continued into three channels. One of these channels leads immediately into a large sperm chamber (*sch*) which occupies the strongly swollen, medial pole of the female funnel. The lumen of this sperm chamber is very irregular, being reduced by large ridges and walls projecting into it from the inner surface; the latter is festooned all over with the darkly coloured anterior ends of spermatozoa whose pale caudal ends project into the lumen. Another channel leads from the central lumen of the female funnel in a medio-dorso-ventral direction into the very short and narrow stalk of an irregularly kidney-shaped egg sac (*es*). This sac closely covers the whole dorsal side of the female funnel. The third channel leads from the central lumen of the female funnel into a long, slender connecting duct (*cd*). At the outset this duct forms two short and narrow loops which are closely pressed against the anterior side of the female funnel. Further on it narrows a little, passes freely mediad, and then joins the posterior wall of the spermathecal branch of its side. Finally becoming very thin, so that its axial lumen is hardly visible, it enters the spermathecal branch a short distance above its first lateral bend.

Remarks. This new species is closely related to *P. baralypton* Cognetti (1911, p. 507, figs. Aa and B), presumably from Nairobi, Kenya Colony, but differs from it in the following more or less important points. The seminal-vesicles (sperm-sacs) of *P. baralypton* are short, extending only into segments XII or XVIII, and each terminates posteriorly in a tubular appendix. In *P. loveridgei* these organs show large, moniliform swellings and extend as far as segments XXVI or XXVII. The question arises as to whether these organs are fully developed in the type of *P. baralypton* or whether their shape results from reduction with consequent systematic value.

The ectal part of the glandular tract of the euprostates is not modified in *P. baralypton* as in *P. loveridgei*, for in the former it is not distinctly set off from the euprostate middle tube, at most it is only slightly widened.

The female funnel and its appendages differ markedly in the two species; in the description of *P. baralypton* nothing is said of a sperm chamber, which is so distinct in *P. loveridgei;* in *P. baralypton* the connecting duct bears a large globular appendix near its medial end while I have been unable to find any trace of such an appendix in any one of the four females whose organs I have examined. I must confess that I do not altogether understand the author's description and figure.

Is that portion which he designates an egg capsule (fig. B.e.c.) homologous with the organ which I call ovarian bladder (Eitrichterblase), or is it part of the female funnel?

In my opinion the most striking differences between these two related species is to be seen in the shape of the medial part of the spermatheca, and in the presence or absence of a globular appendix at the connecting duct. The shape of the main portion of the spermatheca is narrow and only bifurcating about its middle in *P. lovcridgei* whereas it is broadly swollen in segments XIV, XV and XVI, and only bifurcates in front of the base of the diverticula in *P. baralypton.*

Polytoreutus malindinus sp. nov.

One rather soft specimen, from Malindi (3°13′ south lat., 40°8′ east lat.), 50 feet, Kenya Colony. 30.vi.1934.

External Characters. Length 58 mm., diameter 1½–2½ mm., segments about 145.

Colour yellowish gray to yellowish brown.

Setae rather widely paired below, strictly paired laterally (approximately *aa: ab: bc: cd*=8. 6. 8. 3), dorsal distance approximately equalling half the circumference of the body.

Clitellum occupying segments XIV–XVII (=4), apparently saddle-shaped, or possibly annular, though modified ventrally in a different manner and pale glandular, while laterally and dorsally yellowish brown.

Copulatory pores (fig. 13) unpaired, medio-ventrally. Male pore marked by a broadly triangular depression whose base is medio-ventrally placed at intersegmental furrow XVII/XVIII; the blunt anterior angle meets a small, slender transverse furrow somewhat behind the middle zone of segment XVII. I was unable to determine whether the male pore was actually situated in this transverse furrow or in intersegmental furrow XVII/XVIII, though I imagine that the latter is correct; the depression of the male pore is at segment XVII surrounded by a somewhat lighter, not sharp edged, scarcely prominent glandular modification; spermathecal pore rather indistinct, in a transverse furrow behind the middle zone of segment XVIII, apparently corresponding to the similar furrow at segment XVII, if not in the intersegmental furrow XVIII/XIX. A lighter, not sharp edged, scarcely prominent glandular modification surrounds the transverse furrow, reaching backwards as far as intersegmental furrow XVIII/XIX.

Female pores indistinct, laterally at segment XIV or XVI.

External organs of puberty (fig. 13) very characteristic: A large, transversely oval glandular cushion situated medio-ventrally at segment XIX of which it occupies the whole length, a second medio-ventrally placed cushion of different appearance at segment XXIV, not only occupying the whole length of this segment but encroaching on intersegmental furrows XXIII/XXIV and XXIV/XXV and almost reaching the centres of segments XXIII and XXV; in segment XXIV

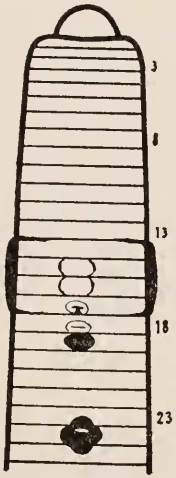

Fig. 13. *Polytoreutus malindinus*. Ventral view of the fore-end, schematically.

this cushion expands laterally to form a roundish projection on either side; the middle part of the cushion is flattened, if not slightly sunk, and bears a narrow, medio-ventral, transverse depression with spindle-shaped contour slightly anterior to the centre of segment XXIV. In addition to these postclitellar organs of puberty are two rather indistinct intraclitellar ones, two broad, medio-ventral cushions occupying the whole length and lower part of segments XV and XVI. These intraclitellian organs have somewhat the appearance of blunt-edged thickenings of the body wall.

Internal Anatomy. In order to mutilate the unique type as little as possible I have avoided dissecting the anterior end. Septum X/XI (as is presumably the case with some of those preceding it) is moder-

ately strongly thickened, septa XI/XII and XII/XIII slightly thickened, those following are thin.

Alimentary canal. The last unpaired, ventral, chylous pouch is in segment XI, it is tubular and stoutly ovoid with fairly numerous chylous tubules; a pair of elongate, broadly ridged, chylous pouches, together nearly encircling the oesophagus, present in segment XIII.

Anterior male organs: A pair of very broad testis sacs, in whose basal part are the testicles while the rest is filled with developing masses of sperms, occupy the entire length of segment XI, slightly narrowing at the base and somewhat more just before septum XI/XII where each continues into a very thin, tubular seminal vesicle of equal content. These tubes extend backwards through many segments and broaden to form the seminal vesicles proper; after reaching the posterior end of the long euprostates, the seminal vesicles proper extend into segment XXXVIII. The sperm reservoirs are moderately stout, cylindrical, but not smooth being irregularly crenulated and incised by the septa. The sperm reservoir in the posterior part of segment XI appears to be thickly tubular with rather stout walls and an irregularly meandering lumen. There the ental end narrows and then enters the posterior part of the appropriate testis sac, after which it immediately widens to form the male funnel.

Posterior male organs somewhat severely damaged in sectioning as poorly fixed and consequently soft. Glandular part of the euprostates apparently rather long and moderately stout; there does not appear to be a common copulatory pouch, certainly not a conspicuous large one.

Female organs and spermathecal apparatus (fig. 14): The main part of the spermatheca is a simple, smooth, moderately long, about 0.25 mm. diameter tube (*sp*) which is loosely attached to the body wall in the medio-ventral line and extends backwards for a short distance behind the spermathecal pore region (this posterior part was damaged in preparation). This median spermathecal tube bears 6 or 7 pairs of pyriform diverticula (*dv*) whose rather narrow stems are distinctly differentiated from the median tube; their main portion is rather large, bent upwards, loosely attached to the alimentary canal which is almost completely encircled by each pair and almost extending to the dorsal vessel. It is possible, though improbable, that a posterior seventh pair of diverticula may have been destroyed. The wide lumen of the thin-walled diverticula contains more or less thick masses of densely and irregularly coiled, filaceous spermoneugmas while the median tube, as well as the anterior branches, is empty in the present specimen; the forepart of the median spermathecal tube in segment XIII is regularly

rounded, and gives rise to a pair of sharply set off, narrow stemmed anterior branches (*sb*) whose main part is irregularly cylindrical, usually about 0.35 mm. diameter. The stem, rather sharply set off from the main portion is moderately long and about 0.06 mm. diameter. The female apparatus lies posterior to the ental ends of the anterior branches of the spermatheca. No trace of ovaries or ovarian-bladders; the closed female funnels (*ff*) are regularly pyriform; their broad median pole is continued into a distinct connecting duct (*cd*) which enters

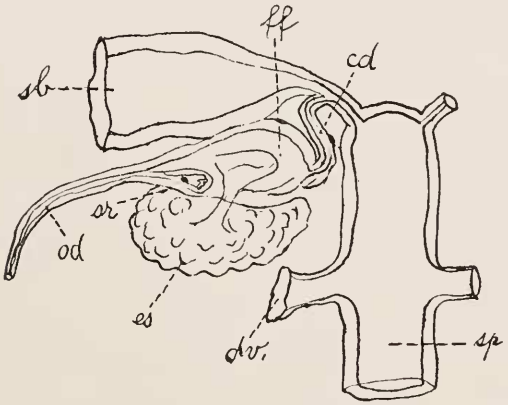

Fig. 14. *Polytoreutus malindinus*. Female apparatus of the right side, and adjacent parts of the spermatheca, the hinder part of the latter, as well as the diverticles and the ectal part of the spermathecal branches being cut off.

the stem of the appropriate anterior branch of the spermatheca. The connecting ducts are about 0.5 mm. diameter throughout their length, moderately long, irregularly bent. The lumen of the female funnels is rather wide but not quite simple, somewhat conchoid. I failed to recognise any opening of any ovarian bladder into the body cavity of segment XIII. It gives rise to a narrow channel extending backwards into the short, narrow stem of a large, kidney-shaped egg sac (*es*) which lies just behind the female funnel and partly covers it. The thin lateral poles of the female funnels are continued each into a long, very slender (approximately 0.05 mm. diameter) oviduct. A pyriform sperm chamber (*sr*), with an apparently not quite simple lumen, is situated in the wall of the female funnel, or near its transition into the oviduct, into which the laterally directed, axial lumen of the sperm

chamber discharges the sperm chamber does not project above the general, smooth surface of the female funnel.

Remarks. *P. malindinus* belongs to the group of *P. violaceus* Beddard (1894, p. 230 and Michaelsen, 1897, p. 51); for further comments see under *P. bagiloanus* sp. n. on page 472, following.

Polytoreutus askarorum sp. nov.

One specimen, somewhat softened and with shrivelled cuticle, from Bagilo (about 6°50′ south lat., 37°50′ east long.), 6,000 feet, Uluguru Mountains, Tanganyika Territory. 20.x.1926.

External Characters. Length 140 mm., average diameter 4½–5 mm., anterior to the clitellum swollen to a diameter of about 6 mm., segments about 220, but this number is very inexact.

Colour in general yellowish, light ashy gray dorsally on the anterior part of the body.

Setae slender, not easy to distinguish in the shrivelled cuticle, doubtless arranged as in the other species of this genus.

Clitellum at segments XIV–XX (or XXI ?), indistinctly developed at segment XIV (and also XXI ?), anteriorly annular. In the clitellar region the intersegmental furrows are shallower, but not entirely eliminated.

Male pore (fig. 15) situated medio-ventrally at intersegmental furrow XVII/XVIII in the centre of a circular, whitish, glandular field which reaches nearly as far as intersegmental furrow XVI/XVII and XVIII/XIX; this male field does not project distinctly above the level of the body wall and can scarcely be called a male porophore.

Spermathecal pore indistinctly medio-ventrally at intersegmental furrow XVIII/XIX.

External organs of puberty (fig. 15) very characteristic, but rather indistinct in the softened and shrivelled type. In the centre of the anticlitellar part of the body there is a medio-ventral, regularly elliptical copulatory field, nearly three times as long as broad, just beginning at intersegmental furrow VI/VII and extending backwards as far as furrow XI/XII, or possibly even beyond segment XII. In this present specimen the copulatory field is marked by a narrow, though rather deep, furrow at its border line, but apparently not by a glandular modification of the body wall. Intersegmental furrows are not obliterated in this area; at its posterior end the copulatory field appears to be open, the furrows bordering it are apparently continued

over segment XII in lines parallel to the axis of the body. Obviously there are postclitellar organs of puberty correlated with this anteclitellar organ, but they are rather indistinct in this specimen, in fact I did not recognise them until I specially examined the related region of the body as far behind the copulatory pores (the male and spermathecal pores) as the copulatory field lies before them. Then I recognised a series of medio-ventral, transversely-oval patches at segments XXIII, XXIV and XXV, even possibly at segments XX and

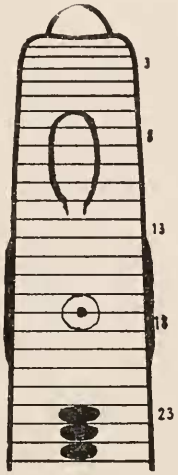

Fig. 15. *Polytoreutus askarorum.* Ventral view of the fore-end schematically.

XXVI though scarcely recognisable. These patches are nearly as broad as the anteclitellar copulatory field, *i.e.* somewhat broader than long, occupying the entire length of their segment. They are distinguished only by a somewhat lighter colour and perhaps by a scarcely noticeable thickening of the body wall.

Internal Anatomy. Septa V/VI–X/XI very much thickened, XI/XII moderately thick, those following thin.

Alimentary canal. A rather small, elongate gizzard in segment V, 3 unpaired, chylous pouches depend ventrally from the oesophagus in segments IX–XI; paired chylous pouches, unrecognisable as the alimentary canal, is injured in this region.

Anterior male organs metandric. A pair of testicles depend from the ventral margin of septum X/XI into segment XI, each is enclosed

in a broad, cylindrical, testis sac which, arising obliquely, passes to the dorsal part of septum XI/XII; presumably these sacs penetrate this septum to be continued beyond as a pair of slender, tubular seminal vesicles. Actually, I did not see these tubular portions which are presumably collapsed, but I found, far behind the region of the sexual pores, two moderately long, stout, tubular seminal vesicles, one closely attached to the intestine, the other to the body wall, irregularly meandering through 5 or 6 segments. They are densely packed with spermogems, but I could not recognise any connection with the male organs of segment XI; doubtless the connecting tubes were destroyed. A pair of tubular sperm reservoirs lie in segment XI close in front of septum XI/XII; their ental part is thin, coiled, and partly (?) enclosed in the posterior part of the testis sacs, into which they doubtless open by means of their funnels; their ectal part, thick, and with a moderately wide lumen, descends in a straight line, and narrowing, pierces septum XI/XII, each being continued as a vas deferens.

Posterior male organs asymmetrically developed; only a single euprostate, that of the right side persisting; it is long, cylindrical though somewhat depressed, white, forming a double loop, attached to the intestine almost throughout its length, its rounded ental end lying in segment XXVI from where it passes forwards as far as into segment XIV, then turns backwards as far as segment XX, then finally forwards again; in segment XVIII it narrows and turns mediad enters the body wall, and apparently discharges in a simple manner through the median male pore at intersegmental furrow XVII/XVIII. The euprostate seems to be chiefly glandular without sign of muscular tissue either in its main portion or at its narrowed, ectal end, *i.e.* its duct. It is questionable whether the asymmetry of the euprostatic apparatus is normal, or should be regarded as abnormal.

Female organs and spermatheca (fig. 16): I could not detect ovaries, ovarian bladders, or ovarian channels; perhaps they were already macerated in the present specimen. The main part of the spermatheca (*sp*) is a moderately thick, unpaired median tube, closely attached to the body wall, extending from segment XIII into segment XX, where it ends in a small, nearly globular knob, thickest at segments XVII and XVIII. The underside of the organ, when dissected from the body wall, shows furrows corresponding to the intersegmental septa; these furrows are not continued over the upper side of the main spermathecal tube; the indistinct opening of the spermatheca lies a short distance in front of the posterior end. The forepart of the median spermathecal tube

shows no bifurcation, but the sides of its terminal tract in segment XIII are continued into a pair of transverse branches (*sb*) which are just as thick as the median part and not distinguished from it by any constriction. These cylindrical spermathecal branches have a rather long, rounded free end, bent upwards, and almost encircling the oesophagus in segment XIII. Between these branches and the terminal knob of the spermathecal tube in segment XX, 6 pairs of lateral

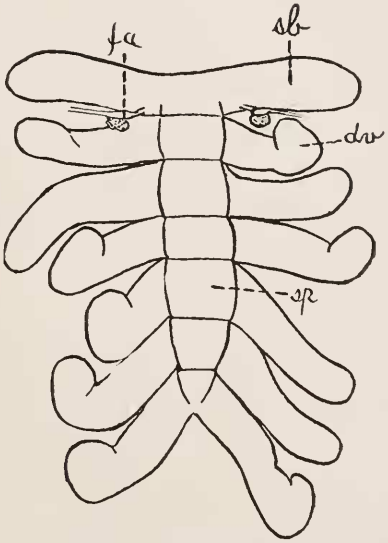

Fig. 16. *Polytoreutus askarorum.* Spermatheca and female organs.

diverticula (*dv*) arise out of the median tube, one pair in each of the six segments from XIV to XIX inclusive. These diverticula have nearly the same shape and size as the anterior branches of the main spermathecal tube, from which they are not sharply distinct; at the medial end they are not in the least narrowed, actually being so stout as to be in contact with one another. Like the spermathecal branches they are bent upwards, encircling the alimentary canal; they are not shaped as regularly as those branches, however; in places they are swollen, especially the 2 hinder pairs, or reduced while frequently the free end is bent off. The female apparatus is closely attached to the anterior branches of the spermatheca; to the posterior side of the

branches — a little distance to the side of where they spring from the median tube and rather far from the free ends of the branches — a closed female funnel is attached to each side. This funnel (*fa*), with a partly wide and partly narrow lumen, describes a double loop in its narrower part, bears a stout kidney-shaped, short-stemmed egg-sac at its upper side. Medially it is continued into a narrow, moderately long, connecting tube, which, becoming even more slender, enters the branch of the spermatheca near the point of its origin from the median spermathecal tube. The lateral pole of the female funnel is continued into a slender female duct; at the point of junction a pyriform sperm chamber discharges through a normal lumen which is closely draped by the dark-coloured, anterior ends of spermatozoa. This sperm chamber is almost wholly embedded in the stout wall of the female funnel, projecting but slightly over the outer surface of the funnel.

Remarks. *P. askororum* is closely related to *P. violaceus* Beddard (1894, p. 230) and Michaelsen (1897, p. 51), *P. malindinus* sp. n. described above, and *P. bagiloanus* sp. n. following. For further comments see *Remarks* under this last species.

Polytoreutus bagiloanus sp. nov.

Two well preserved, adult specimens, from Bagilo (about 6°50′ south lat., 37°50′ east long.), 6,000 feet, Uluguru Mountains, Tanganyika Territory. 20.ix.1926.

External Characters. Length 50 and 60 mm., diameter about 2 mm., segments about 72 to 82.

Colour whitish, apparently not pigmented.

Fig. 17. *Polytoreutus bagiloanus.* Dorsal view of the head.

Head (fig. 17) tanylobous, if not prolobous; prostomium calotte-shaped; segment I is crossed by some longitudinal furrows, of these two, one on either side of the medio-dorsal line, appear to be somewhat sharper than the others, forming lateral borders of a dorsal appendage of the prostomium, making the head tanylobous. At their anterior end, however, is a slender transverse furrow looking like the posterior

border of the prostomium and making the head prolobous, if we do not admit as an appendage of the prostomium the two sharper furrows already mentioned.

Setae moderately large, medio-ventral distance only slightly greater than the distance between the setae of a ventral pair, approximately as large as the medio-lateral distances; the distance between the setae of a dorsal pair about half as large as the medio-ventral distance; medio-dorsal distance approximately equals half the circumference of the body (approximately *aa*: *ab*: *bc*: *cd*=6: 5: 6: 3; *dd*=ca. ½ *μ*).

Clitellum chief annular, occupying the ventral portions of segments XIV–XVI (=3), dorsally segments 1/n XIII–1/n XVII (=3 2/n), inclined against intersegmental furrow XII/XIII and XVII/XVIII.

Male pore distinct, marked by a brownish spot, medio-ventrally at intersegmental furrow XVII/XVIII in the centre of a transversely oval, almost circular, whitish, glandular field.

Female pores indistinct, laterally near, or in, intersegmental furrow XIV/XV.

Spermathecal pore indistinct, medio-ventrally at intersegmental furrow XVIII/XIX.

External accessory organs of puberty similar in both specimens, 3 medio-ventral, transversely oval, nearly circular glandular cushions occupying the whole length of their segment, 1 postclitellar very prominent cushion at segment XXII and 2 clitellar cushions, somewhat less prominent though at the same time somewhat larger as the real clitellar segment is longer than the ordinary segments, at segments XIV and XV.

Internal Anatomy. Septa V/VI and VI/VII very thin, VII/VIII–XI/XII moderately though distinctly thickened, IX/X–X/XI stoutest, XI/XII only slightly thickened.

Alimentary canal. A moderately large, cylindrical gizzard in segment V; 3 unpaired, chylous pouches depend ventrally, by a short and slender stem, from the oesophagus in segments IX–XI they are ovate, tubule pouches without a central lumen; a pair of lateral, chylous pouches ridged pouches, in segment XIII.

Anterior male organs. Testicles not recognised; a pair of testis sacs, in segment XI, rise from a narrower base in the antero-ventral part of their segment; they successively accrue, their broader part resting against the stout sperm reservoir in the posterior part of the segment where a tenuous seminal tube proceeds from them. This, going backwards through many segments, forms the anterior, tubular

part of a seminal vesicle and extends to segment XXXI just behind the posterior end of the euprostates. The tubular part of the seminal vesicles suddenly broadens to form the seminal vesicles proper which extends backwards through many segments, in a carefully examined specimen as far as segment LVIII. A true seminal vesicle is a broad, flat, irregularly lobed band, closely attached to the dorsal side of the intestine, and deeply grooved at the intersegments. A pair of large, ovate sperm reservoirs are situated ventrally in the posterior part of

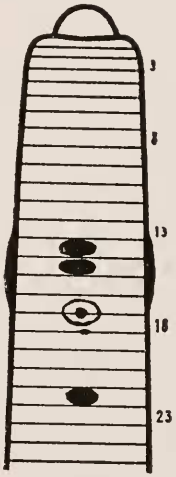

Fig. 18. *Polytoreutus bagiloanus.* Ventral view of the fore-end.

segment XI; out of their upper pole arises a sharply distinct, very narrow, short tube which bends sharply downwards and soon after enters the anterior end of the tubular portion of the seminal vesicles where it doubtless ends in a small male funnel (not distinctly seen). At the lower pole of the sperm reservoirs a narrow tube arises in a similar manner and proceeding backwards forms a single male duct.

Posterior male organs. The euprostates have a long, tubular, colourless glandular part extending backwards into segment XXX. Its muscular coat is scanty and irregular, in places scarcely recognisable. Its lumen is moderately wide, irregularly constricted, reduced by some longitudinal walls composed of more or less thick glandular epithelium. The structure of the glandular part is similar to that of *P. violaceus* Beddard (1894, pl. xvi, fig. 3), but the muscular coat of

the latter seems to be thicker and more regular. The anterior ends of the glandular part are bent abruptly towards the middle and, without diminishing in diameter, unite in a short, transverse, common median part which, though of a similar diameter, differs by its glistening muscles. The male ducts enter the ectal end of the glandular part in an apparently normal, direct manner (not quite clearly seen).

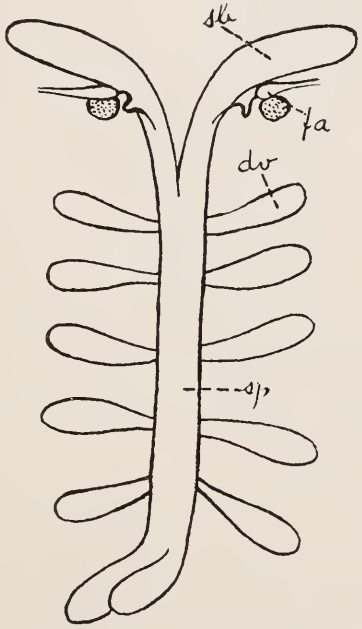

Fig. 19. *Polytoreutus bagiloanus.* Spermatheca and female organs.

Female organs and spermatheca (fig. 19): The main portion of the spermatheca is a median, smooth tube (*sp*) about 6 mm. long and 0.6 mm. broad, closely attached to the ventral body wall and reaching from segment XV into segment XX. A short distance before its posterior end it discharges through a minute conical duct. It bears 6 pairs of lateral diverticula (*dv*) which are arranged transversely as a rule. These diverticula are pyriform or elongatedly oval, somewhat narrowed at their ectal end, and not densely crowded but distinctly separated from one another, mostly somewhat bent upwards but by no means encircling the alimentary canal as they are far too short. The

diverticula of the posterior pair arise close beside each other from the posterior end of the common tube and are bent backwards. The anterior part of the main tube, reaches septum XIV/XV, and divides to form two branches (*sb*) which are about half as stout as the main tube. These branches diverge gradually at first, then more distinctly, bending sideways and upwards as they somewhat increase in size until they terminate in a globose blind end. The female apparatus (*fa*) is attached to the posterior side of the central and more basal part of the anterior branches of the spermatheca. The closed pyriform, female funnel bears posteriorly a short and slender stemmed, large, subglobular egg-sac. Laterally the narrower pole of the female funnel is continued into a slender oviduct, the wall of the ental end of the oviduct, as well as of the anterior side of the female funnel, contains some pyriform sperm chambers whose broad, blind ends project slightly beyond the outer surface of the organ. In part these sperm chambers seem to discharge through a common duct. Out of the broad medial pole of the female funnel arises a rather long, moderately and equally stout throughout its length, connecting tube which forms two wide loops before becoming attached to a spermathecal branch. Descending beside the latter, it finally enters the spermathecal branch at a point only moderately distant from the beginning of the median, unpaired, main portion of the spermatheca. I could recognise neither the ovaries nor ovarian bladders.

Remarks. *P. bagiloanus*, as well as *P. malindinus* and *P. askarorum* described above, together with *P. violaccus* Beddard (1894, p. 230, pl. xvi, figs. 3 and 7; Michaelsen, 1897, p. 51) and its variety *variabilis* Michaelsen (1897, p. 51) form a group of closely related species. As far as external characters are concerned these species may be readily distinguished by the number, arrangement, and shape of the external organs of puberty. *P. violaccus* and its variety have only a single postclitellar cushion. *P. malindinus* has two postclitellar cushions of different shapes, while the remaining species each have three glandular cushions similarly shaped, *P. askarorum* only postclitellar ones, *P. bagiloanus* a single postclitellar and two intraclitellar ones. As for the internal organization, the four species are best characterised by the shape of the spermatheca, whose differences are easily seen in the corresponding figures (Beddard, 1894, pl. xvi, fig. 7 for *P. violaceus;* and this paper, fig. 14 for *malindinus*, fig. 16 for *askarorum*, fig. 19 for *bagiloanus*).

Polytoreutus minutus Michaelsen

Polytoreutus minutus Michaelsen, 1912, Arkiv. Zool., **7**, No. 32, p. 2: Kenya district, Kenya Colony.

One specimen in good condition, from Mount Mbololo (about 3°20′ south lat., 38°30′ east long.), 4,800 feet, Teita, Kenya Colony. 13–18.iv.1934.

Locality. This additional material is especially valuable on account of its exact locality data, which was vague in the type. While Kenya Province covered a huge area extending from Thika in the south to the Northern Guaso Nyiro in the north, I am uncertain of the limits implied by Kenya district in 1911, presumably a small area around the mountain in Kenya Province, Kenya Colony.

Remarks. The specimen listed above is slightly larger than the type, being 42 mm. long and from 1.5 to 1.65 mm. in diameter with about 135 segments, whereas the type was only 32 mm. long and had 119 segments.

The male pore in the type "ziemlich gross, augenförmig" is marked in the Mbololo example by a rather deep, moderately broad hole which is inclined forwards against the middle zone of segment XVII. It is situated in the centre of an oval, whitish, glandular field which is somewhat longer than broad, and occupies the entire length of segments XVII–XVIII, even encroaching slightly on segment XVI.

Polytoreutus chaloneri Smith and Green

Polytoreutus chaloneri Fr. Smith and B. Green, 1919 (1920), Proc. U. S. Nat. Mus., **55**, p. 156, figs. 10–12: Mkonumbi, near Lamu, Kenya Colony.

One specimen, from Mkonumbi (2°16′ south lat., 40°42′ east long.), 50 feet, near Lamu, Kenya Colony. 21.v.1934.

One specimen, from Mombosasa (2°20′ south lat., 40°30′ east long.), near Witu, Kenya Colony. 31.v.1934.

Remarks. In the type from Mkonumbi, the copulatory pores (*i.e.* the male pore and the spermathecal pore) were surrounded by only slight thickenings of the body wall. In this fresh material, which includes a topotype and a worm from Mombosasa less than twenty miles west of the type locality, the body wall shows much more prominent modifications (fig. 20) in this sexual area. The entire ventral part of segments XVI–XIX has a somewhat glandular appearance without being sharply bordered. The male pore, marked by a small brownish pit, lies at the apex of a very prominent, nearly hemispherical

porophore. The circular base of this porophore occupies the whole length of segments XVI and XVII; the laterally distinct intersegmental furrow XVI/XVII is obliterated within the limits of the porophore with the result that the relation of the male pore to this furrow is not clearly recognisable in these specimens, I should have described it as "in or very near XVI/XVII" but it may have been displaced while the male pore was projecting. It is stated of the type that the male pore is "slightly anterior to the middle of segment XVII." Segments XVI–XIX are, at least laterally, distinctly divided into 3 annuli, each being separated by two fine secondary annular furrows. While the secondary furrows adjacent to furrow XVI/

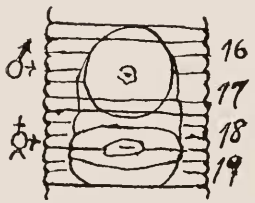

Fig. 20. *Polytoreutus chaloneri.* Ventral view of the region with the copulatory pores.

XVII vanish, like the latter, in the limits of the male porophore, the secondary furrows of XVI and XVII further from furrow XVI/XVII cross the male porophore. The area surrounding the spermathecal pore is also differently modified; the whole ventral portion of the body wall of segments XVIII and XIX is glandularly thickened, intersegmental furrow XVIII/XIX is very distinct in the region of this glandular thickening, but the secondary furrows, which are only laterally distinct, disappear here, and are replaced by deep, transverse, medio-ventral furrows in the middle zones of segments XVIII and XIX, dividing the ventral parts of these segments into two swollen, transverse fields; the fields adjacent to intersegmental furrow XVIII/XIX are somewhat more prominent than those bordered by furrows XVII/XVIII and XIX/XX. The spermathecal pore, a rather inconspicuous slit situated medio-ventrally at XVIII/XIX, is surrounded by a slight modification of the body wall, which forms a transversely oval field only distinguished by its lighter colouring and not very prominent.

Polytoreutus multiporus Smith and Green

Polytoreutus multiporus Fr. Smith and B. Green, 1919 (1920), Proc. U. S. Nat. Mus., **55**, p. 161, figs. 13–18: Mkonumbi, near Lamu, Kenya Colony.

Two specimens, from Mkonumbi (2°16′ south lat., 40°42′ east long.), 50 feet, near Lamu, Kenya Colony. 21.v.1934.

Four specimens, from Gongoni (3°5′ south lat., 40°10′ east long.), 75 feet, 10 miles north of Malindi, Kenya Colony. 27.v.1934.

One specimen, from Malindi (3°13′ south lat., 40°8′ east long.), 100 feet, 65 miles north of Mombasa, Kenya Colony. 30.vi.1934.

One specimen, from Changamwe (4°1′ south lat., 39°37′ east long.), 192 feet, 3 miles west of Mombasa, Kenya Colony. 4.vii.1934.

Remarks. The topotype from Mkonumbi, the only complete one, differs most noticeably from the type and cotype in its dimensions. It is exceptionally slender, about 270 mm. long and averaging about 3 mm. in diameter. The much greater number of segments, *viz. ca.* 670 is in conformity to its greater length.

The external organs of puberty exhibit some variation in number and character, most of the specimens from the new localities agree with the types in regard to their postclitellar setal papillae, having 9 or 10 papilla at each side of segments XIX–XXVII or XIX–XXVIII (in the types, 8 or 9 pairs at segments XIX–XXVI or XIX–XXVII).

The Gongoni series differ remarkably from the rest in having, without exception, 5 postclitellar segments with genital setal papillae, normally at segments XIX–XXIII except for one individual, and then only on its right side, where the papillae of the last pair are lacking in segment XXIII being displaced to segment XXIV.

In all eight specimens there occurs besides the posterior organs of puberty, some anterior ones, presumably lacking (at least not mentioned) in the types from Mkonumbi. These anterior organs have a two-fold character, firstly there are setal papillae, like the posterior ones, usually 2 pairs on either side of segments XV–XVI, rarely (in two examples from Gongoni) indistinguishable in part, once a pair of supernumary papillae on the left side of segment XIV; secondly in some specimens (from Gongoni and one from Mkonumbi) 2 large, medio-ventral, transversely oval, glandular cushions are present at segments XV–XVI, occupying the entire length of these segments and bearing on their sides the setal papillae, or rather the sexual setae, the papillae of these setae being more or less sunken in the glandular mass of the cushions and in consequence rather indistinct.

One of the Gongoni specimens bears a protruding penis (fig. 21) similar to that figured by Smith and Green (*loc. cit.* fig. 13) with which it agrees in its annulations but differs in the shape of its ectal end. The latter is somewhat broadened and truncated to form a generally

Fig. 21. *Polytoreutus multiporus.* Projected copulatory pouch of the right side.

plain surface which is not quite even but shows the external edges of some folds formed by the wall of the penis. The edges of these folds have the form of a 'W' above the middle line of which lies the apical plane of a transversely oval bladder. It should be remembered that a different degree of protrusion of the penis would presumably result in its ectal end taking on a somewhat different form.

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